

Serial No. 09/942,004
Atty. Docket No. FR000089
Page 2 of 8

CLAIMS LISTING

The current listing of claims, as amended hereby, supercedes all previous listing of claims.

1. (Presently Amended) An image processing method for extracting a threadlike structure (GW) represented in an image, comprising steps of:

executing a phase of acquisition (10)-of a sequence of images, including an image of a present instant (t) in which the threadlike structure is to be extracted and an image of a past instant (t-1) in which the threadlike structure is detected as a string of points (G_{t-1}), and further comprising:

executing a phase of prediction (20)-of a silhouette (G_t) of the threadlike structure estimated from said detected string of points (G_{t-1});-of the image of the past instant,

executing a phase of pursuit (30)-for extracting a final string of points (G_t) representing the threadlike structure in the image of the present instant t, including estimating a constraint CZ_t, defined as a search zone, and θ, defined as the direction of steps of estimation of constraints (CZ_t, θ)-based on said silhouette (G_t), said constraints utilized for performing said extraction.

2. (Presently Amended) The method of Claim 1, wherein in the prediction phase (20), the silhouette (G_t) is formed of the string of points (G_{t-1}) detected in the image of the past instant (t-1).

3. (Presently Amended) The method of Claim 1, wherein :

the step of executing the acquisition phase-(10) comprises a first image of a first past instant

(t-2) and a second subsequent image of a second past instant (t-1), in which the threadlike structure is detected as respective first and second strings of points (G_{t-2}, G_{t-1}), and

the step of executing the prediction phase (20)-comprises at the calculation of a translation value (5) and a speed of translation between the first and second strings of points (G_{t-2}, G_{t-1}), wherein and the calculation of thea translation value to occurs between the second past

Serial No. 09/942,004
Atty. Docker No. FR000089
Page 3 of 8

instant (t-1) and the present instant (t), and wherein the translation value is utilized for estimating the location of the silhouette (\hat{G}_t) in the image of the present instant (t).

4. (Presently Amended) The method of claim 1, wherein within the step of executing in the pursuit phase (30), the steps of estimation of constraints requires comprises the estimation of the a SearchZoneSearch Zone (CZ_t) in the image of the present instant (t) around the silhouette (\hat{G}_t) for a constrained extraction of the final string of points (G_t) in said Search Zone (CZ_t).

5. (Presently Amended) The method of Claim 4, wherein the SearchZoneSearch Zone (CZ_t) is a Canal-Shaped Zone, and may be referred to interchangeably as labeled Canal Zone (CZ_t) or Search Zone (CZ_t), and is centered on said silhouette (\hat{G}_t).

6. (Presently Amended) The method of claim 4, wherein the steps of estimation of constraints comprises the estimation of an interval of directions ($\Delta\theta$) associated to the points of the Search-Zone (CZ_t).

7. (Presently Amended) The method of Claim 6, wherein a neighborhood is estimated for each given point of the Search Zone (CZ_t) so that said neighborhood intersects the silhouette (\hat{G}_t) and determines a segment (K_1, K_2) and wherein the directions (θ) of the silhouette (\hat{G}_t) are determined at each point of said segment, forming a set of directions, which set of directions determines the interval of directions ($\Delta\theta$) for a constrained extraction of the final string of the points that are associated to an interval of directions ($\Delta\theta$).

8. (Presently Amended) The method of Claim 7, wherein the Search Zone (CZ_t) is a canal-Shaped zone which may be referred to interchangeably as Search Zone (CZ_t) or labeled Canal Zone (CZ_t), and is estimated by an operation of mathematical morphological dilation using discs (or spheres) (D_k) of a predetermined radius (R_t) around the silhouette (\hat{G}_t), including extracting and wherein the extraction of a string of points is performed in said Canal Zone (CZ_t) by ridgness estimation along the directions of the interval of direction associated to each point and the final string of points (G_t) is selected from the points having the highest ridgness.

Serial No. 09/942,004
Atty. Docket No. FR000089
Page 4 of 8

9. (Presently Amended) The method of claim 1, further comprising that, in the step of executing the pursuit phase-(30), includes evaluating a tip of the extracted string of points to determine, steps of tip evaluation for determining whether the tip of the extracted string of points is correctly located for representing the threadlike structure in the image of the present instant.

10. (Presently Amended) The method of Claim 9, further comprising the step of executing in the pursuit phase-(30), steps of includes correlating a shape correlation for estimating the correct location of a final tip for the final string of points (G_t) representing the threadlike structure.

11. (Presently Amended) The method of claim 1, wherein having a loop (4) of execution is carried out between the step of pursuit phase execution(30) and the step of prediction phase execution(30) for improving the detection of the silhouette (\hat{G}_t) and the extraction of the string of points (G_t) for representing the threadlike structure (GW) in the image of the present instant (t).

12. (Presently Amended) A system comprising a suitably programmed computer or a special purpose processor having circuit means, which circuit means is arranged to process image data according to the method as claimed in claim 1.

13. (Presently Amended) A medical examination imaging apparatus having circuit means for acquiring medical digital image data, and having a system which has having access to said medical digital image data according to Claim 12, the medical examination imaging apparatus further including and having display means for displaying the medical digital images and the processed medical digital images.

14. (Presently Amended) A computer program embodied in a computer readable medium product comprising a set of instructions for carrying out a method as claimed in claim 1.